HOUSTON POST

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Spies in sky keep two big powers in balance

Morris

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All that has kept the world from self-destructing this last quarter of a century has been the precarious nuclear balance between the United States and the Soviet Union.

For a few short years America had an overwhelming preponderance of power. We were certain we would never resort to it, but our mere possession of such nightmarish power drove the Russians to distraction. Then they in their turn achieved an edge—and regained a measure of stability—and it was our turn to taste the fear in the phrase "missile gap."

A decade ago the balance was regained and has since been maintained. The number of missiles, their megatonnage and their guidance systems are largely irrelevant; what counts is that neither power can launch a preemptive strike with any hope of survival, and on this balance hangs the peace of the world.

Tiger by the tail

The balance, however, is far from static. Both powers hold a fearsome tiger by the tail. Research and development must continue lest one side or the other achieve a breakthrough in delivery or defense, which might destroy the balance. The expense of such a breakthrough—indeed the expense of maintaining the current balance—is so hideous that both powers would like to avoid it. They are committed to a continuing arms race not by the need to achieve a breakthrough but only by the imperative of not permitting the other to do so.

Both sides recognize the need for a mutual effort to scale down their arsenals. In the past, negotiations over disarmament foundered on a single element—trust. The issues at stake were so overriding that neither the U.S. nor the Soviet Union could afford to accept the other's word that an agreement would be adhered to.

The recent SALT talks, however, have achieved initial and encouraging successes, and the key to the progress can be found in an innocuous euphemism the treaties employ: "National technical means of verification". The phrase refers to a program which supplies an acceptable substitute for the missing ingredient of trust, and on that program rests all hope of reversing [illegible] race.

The "national [illegible] means of verification" are the photo reconnaissance satellites employed by both America and [illegible] referred to as SAMOS (for "satellite and missile-observation system"); the Soviet satellites are referred to as COSMOS, and while neither country will discuss their details, they do, as the result of a 1962 agreement, report each launch and its orbital characteristic to the UN.

The programs give both countries a positive check on the nuclear activities of the other. Neither nation can test or deploy a major new weapons system without timely—and highly detailed—warning accruing to the other.

The United States launches four or five "search-and-find" SAMOS missiles annually from Vandenburg Air Force Base in California. They remain in orbit about a month, covering the entire surface of the globe twice a day, once at night (when infra-red photography, sensitive to heat emissions, gives almost as much information as daytime passes) and once during the day.

The photographic results are radioed back, and despite the loss in resolution, construction work of any description is at once apparent when photos taken a few days apart are superimposed.

Each search-and-find satellite is followed a month or two later by a "close-look" satellite, which photographs the specific areas of interest its predecessor has spotted. These photographs are not transmitted electronically. Instead the satellite ejects the film capsule itself, which is recovered in mid-air by specially equipped planes based in Hawaii.

What photos show

The pictures are analyzed at the National Photographic Interpretation Center (known as "En-pick" to the intelligence community), a little-known joint project located in Washington under the aegis of the Central Intelligence Agency.

The sophisticated interpretation of these photographs provides the vast bulk of what America knows about the Soviet Union, the Eastern bloc countries and the People's Republic of China.

The photos reveal not only major construction — from transportation nets through shipyard activity to all manner of missile facilities — but an astonishing wealth of technical detail as well.

While the U.S. will not talk about the SAMOS program any more than the Soviet Union will discuss the details of COSMOS, the general details of both programs are more or less open secrets.

America's most closely guarded secret, [illegible] resolution [illegible] photographic systems employed by SAMOS. (N.P.I.C., in fact, maintains its own security classification system, and a [illegible] organization won't get you past the front door.)

The first generation of satellite cameras a decade ago were lucky to pick up objects six feet across. The third generation in current use will pick up objects less than two feet across, and the resolution may some day be measured in inches. In terms of analysis, this means that not only can new missile sites, or changes in old ones, be recorded, but the precise technical construction of the missile can be reconstructed in fair detail as well.

The Soviets launch perhaps four times as many satellites as America does, partially because theirs do not last as long, and also because the Soviets are given to "tactical" missions — sending a satellite for a special "look-see" when something of interest is going on.

The U.S. prefers to wait for its regularly scheduled shots, and has sent only one tactical satellite aloft — to check Israeli claims that the Soviets were violating the truce by installing missile sites on the banks of the Suez Canal. Soviet photography is good enough to allay their fears that the U.S. is installing new weapons systems, although the resolution of their cameras is not nearly as good as ours.

High-altitude coverage of the Soviet Union started in the early 1950s when balloon-mounted cameras were launched in Europe to drift across Eurasia before being recovered in the Pacific.

From such crude beginnings we advanced to the U-2 aircraft, which worked like a charm until the Soviets finally developed a missile that could bring it down — with disastrous results for American diplomacy. President Eisenhower had approved the U-2 program only after Premier Nikita Khrushchev had rejected his suggestion of "open skies" inspections. The gap between the U-2 flights and the inception of the SAMOS program was fortunately a short one.

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U. S. NEWS & WORLD REPORT
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HOW U.S. KEEPS TABS ON THE RED WORLD

Thanks to aerial surveillance and space-borne cameras, the world is now virtually an open book to U. S. They've become vital tools of American policy.

President Nixon, directing war moves in Southeast Asia and peace moves with Russia, has at his fingertips a major weapon brought to a peak of reliability during his Administration.

The weapon is this: a constant flow of aerial photographs providing, in minute detail, the kind of intelligence information that no previous President was able to count on.

Over North Vietnam, reconnaissance pilots flying at altitudes of 10 miles or more are able to take pictures that can distinguish between tank models, show the types of trucks and artillery pieces, expose troops in camouflaged bunkers—and even count rifles.

Over Russia, reconnaissance satellites orbiting at 100 miles up—or more than 300 miles—can detect the construction of rocket sites and the firing of missiles. From their pictures, aircraft at landing strips can be identified. The most effective cameras, from 100 miles, can depict objects two feet in diameter and show the writing on billboards.

"Silent army." Such surveillance intelligence—when properly interpreted—is seen as a major key both to the fighting in Vietnam and the possibility of an arms-control pact with Russia. Behind the information fed to the President is a silent army of intelligence specialists using new advances in photography, aeronautics and space technology.

In Southeast Asia, these technicians depend heavily on reconnaissance planes and pilotless drones for the pictures they need. Space satellites are used for back-up material.

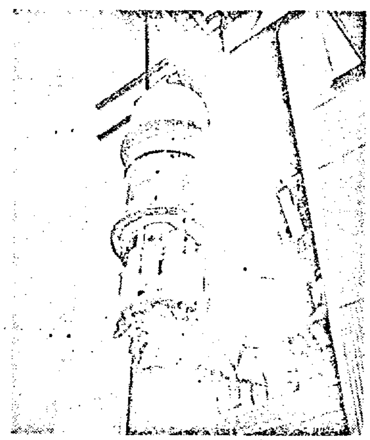
Worldwide, however, the important business of keeping tabs on the Russian and Communist Chinese nuclear-missile build-up rests primarily with the space satellites. Aircraft give better pictures at lower cost. But, since the incident in which a U-2 spy plane was shot down over Russia, aircraft reconnaissance of the Soviet Union has been ruled out.

How they work. Reconnaissance planes and drones have been flown routinely over Southeast Asia since the United States first began bombing North Vietnam in 1965.

The drones have their cameras turned on to take wide-angle pictures continuously while in flight. Reconnaissance pilots, after studying earlier drone photography, can pinpoint their cameras on suspected military activity for closer, more detailed pictures.

The photos are analyzed within minutes at U. S. bases in Southeast Asia. In some cases, the photos are also sent to Washington—either by air or by radio beam, depending on whether the priority is secrecy or speed.

Over the past decade, the U. S. has kept watch on the Soviet Union and Red China with a series of "search and find" satellites whose very names are classified. They are equipped to photograph and radio back to ground stations prints that can be put together to depict the entire country.



"Sky spy" model is readied for testing. Satellite cameras can photograph most of the world.

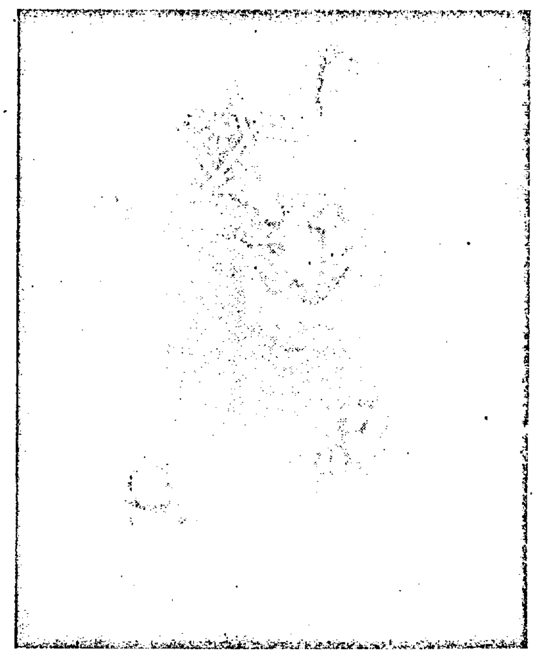
Ground stations for receiving these pictures are located at New Boston, N. H.; Vandenberg Air Force Base in California; Oahu, Hawaii; Kodiak Island, Alaska; on Guam; on the Seychelles Islands in the Indian Ocean, and in Ethiopia. In addition, six shipboard stations, each with a 30-foot antenna, can be deployed around the world to fill blank spots in the network.

The photos are radioed from the satellites and wind up at Sunnyvale, Calif., or in Washington for interpretation.

Another series of "close look" satellites is used to focus on known or suspected subjects of military significance. These photos, of a much higher quality, are dropped by parachute to be retrieved and sent on to the National Photographic Interpretation Center in Washington, D. C.

What's ahead. New and improved reconnaissance satellites, officials say, are in the offing. One, dubbed the "Big Bird," is expected to have an orbital life of several months and to carry a quantity of film packs that can be returned at frequent intervals.

Success of the sky spies has been credited with removing an important hurdle to a U. S.-Russian agreement on limiting arms. Without the satellites, it is argued, no significant agreement could be possible because of the Kremlin's steadfast opposition to on-site inspection teams to enforce a treaty.



Gemini V photo shows African airfield from 100 miles up. Sky spies give much more detail.

Even before arms-control talks started, U. S. officials say the satellites have helped to stabilize relations between the U. S. and Russia—through increased knowledge—and at the same time have significantly reduced U. S. defense spending to protect against the unknown. [END]

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Recon Satellite Assumes Dual Role [redacted]

STATINTL

Launch of spacecraft with both search-and-find and close-look functions marks U.S. move to a new generation of technology

By Philip J. Klass

Washington—U.S. has begun the transition to a new generation of reconnaissance satellites, designed to perform both the search-and-find and close-look functions that previously required the use of two separate spacecraft.

The first of the new-generation satellites, built by Lockheed Missile & Space Co., was launched on June 15 into a near-polar, low-altitude orbit from the Western Test Range (AW&ST June 21, p. 15). The new design is understood to have performed well.

The satellite, unofficially referred to as "Big Bird," weighs approximately 25,000 lb., which is four to five times the weight of present operational designs. The spacecraft, a modified Lockheed Agena measuring approximately 10 ft. in diameter and nearly 50 ft. long, was launched by a USAF/Martin Marietta Titan 3D. It was the first time this large booster with its two large strap-on solid rockets has been used.

Big Bird carries a huge new camera, developed by Perkin-Elmer Corp., which is expected to provide ground resolutions of better than 1 ft. from an orbital altitude just over 100 mi.

Since the U.S. initiated its reconnaissance satellite program in the early 1960s, it has employed two functionally different types of spacecraft, both built by Lockheed using the Agena:

- Search-and-find satellite, for large-area surveillance of the Soviet Union and Red China, to detect new construction facilities of strategic interest. Photos are taken by a camera with a moderate-resolution lens, built by Eastman Kodak Co., and the film is developed on board. Later, when the satellite comes within range of one of seven ground stations situated around the globe, the processed film is scanned by a laser-beam device, produced by CBS Laboratories, to convert the image to an electrical signal which is transmitted to the earth station.
- Close-look satellite, for more detailed examination of newly discovered objects of interest uncovered by the search-and-find type satellite, or already catalogued facilities. This type of satellite usually is outfitted with a high-resolution camera or multi-spectral cameras. After approximately two weeks in orbit, the exposed film, which has fed into the spacecraft's nose capsule, is returned to earth and recovered by Lockheed C-130 aircraft equipped with trapeze-like cables that loop over the capsule's parachute. This is a technique first developed in the USAF/Lockheed Discoverer series.

The current generation of search-and-find reconnaissance satellites is launched into a near-polar orbit using a USAF/McDonnell Douglas Long-Tank-Thrust-Augmented-Thor (LTTAT). Typically the satellite has an initial perigee of about 100 mi. and remains in orbit for three to four weeks.

The close-look type of reconnaissance satellite, slightly heavier than the other type, is launched by a USAF/Martin Marietta Titan 3B. The spacecraft perigee usually is only approximately 80 mi., to maximize ground resolution. The Agena engine, built by Bell Aerospace, is used periodically to boost altitude to provide an orbital lifetime of approximately two weeks.

The U.S. has been gradually reducing the number of reconnaissance satellites of both types which it orbits each year—an indication of the ability of both to carry more film than in the mid-1960s. Whereas the U.S. orbited a total of 13 of the search-and-find spacecraft in 1965, the number declined to only four last year. Similarly, the number of recoverable satellites had dropped to only five in 1970, although the total days in orbit were nearly as many as the U.S. obtained in 1968 by using eight satellites.

Normally, the two types of satellites are launched alternately, allowing sufficient time for photo analysis at the National Photographic Interpretation Center in Washington to study the pictures from the search-and-find spacecraft before selecting targets for the next close-look satellite mission.

The complementary operation of the two types of reconnaissance satellites is illustrated by the time of official and unofficial disclosures on the new types of Soviet missile silos discovered early this year:

- Nov. 18, 1970: U.S. radio transmission-type reconnaissance satellite launched, which remained in orbit until Dec. 11.
- Feb. 9, 1971: Film-pack returned from recoverable type satellite launched on Jan. 21.
- Mar. 4, 1971: Intelligence officials testifying before the Senate Armed Services Committee disclosed the discovery of the new type Soviet silos. At that time, the number of new silos discovered by satellite photos was about 10.
- Mar. 24, 1971: U.S. launches new radio-reconnaissance satellite to search for additional silos of the new type. Satellite remained in orbit until Apr. 12.
- Apr. 23, 1971: Defense Secretary Melvin Laird disclosed the U.S. had discovered approximately 40 of the new type Soviet missile silos.
- Apr. 27, 1971: Laird disclosed that USSR had resumed construction of its anti-ballistic missile (ABM) system near Moscow, after a three-year lull.
- May 13, 1971: Film pack capsule returned from recoverable close-look satellite launched Apr. 22.
- May 26, 1971: Defense Dept. officials disclosed that 60 of the new Soviet silos had now been discovered. They revealed that the new silos had first been discovered in December, 1970—which would be several weeks after the launch of the search-and-find satellite on Nov. 18. Further, that the diameter of the holes had originally been estimated at slightly less than 30 ft. But within recent weeks, the Pentagon officials disclosed, it had been discovered that there were two slightly different size silos, whose inner diameters differed by approximately 4 ft. Of the 60 new type silos, about one-third were at SS-9 missile bases and the remainder at SS-11 sites.
- Aug. 7, 1971: Pentagon officials disclosed that the Soviets now have nearly 80 of the new type silos.
- Aug. 12, 1971: U.S. launches new

Soviet Advance

The Soviet Union also has introduced an improved, longer-lived version of its recoverable reconnaissance satellite. Until the summer of 1968, all of the Russian recoverable satellites remained in orbit for eight days or less.

Cosmos 228, launched on June 21, 1968, was the first to stay aloft for 12 days. Gradually the Soviets began to launch more of the longer-duration spacecraft.

In 1970, nearly half of the 29 recoverable satellites launched by the USSR remained aloft for 12-13 days. During the first six months of 1971, all of the Soviet recoverable satellites remained in orbit for 12-14 days.

The longer-duration satellites enabled the USSR to begin to cut back on the total number of recoverable reconnaissance satellite launches, beginning in 1970. Judging from Soviet launches [illegible] the total will decline again this year by approximately 15%.